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By e-mail

RE: Remediation Statement – Old Weybeards Farm, Harefield UB9 6LH

Dear Ellie

As you are aware, our phsae 2 investigation identified potentially significant contamination. Elevated PAHs and were detected in one sample taken at shallow depth from material forming hardstandings at the east of the main barn. Chrysotile asbestos fibres were also detected in one sample taken at shallow depth from material forming hardstandings at the west of the main barn.

TPHs were not detected in any of the samples tested, and no TVOCs were detected with on-site screening.

Remediation will be required to ensure sensitive receptors are not exposed to elevated contamination or asbestos fibres that may otherwise remain in gardens.

It is considered that relatively simple mitigation measures should be feasible in this case.

It is essential that the client and their appointed contractors familiarise themselves with this document, and ensure the requirements are met.

I would specifically draw your attention to the final section of this report - Verification Action Responsibilities.

1. Remedial Objectives

The principal objective of the remediation will be to remove one or more elements of the identified potentially significant contaminant linkages - this being either the source, pathway, or receptor.

Where the absence of a viable contaminant linkage can be demonstrated, a ‘significant possibility of significant harm’ is no longer deemed to exist. It is crucial that the remediation results in a high degree of certainty that the potential contaminant linkages have been removed or severed permanently.

However, remediation should be undertaken in a way that is sustainable and proportionate in terms of environmental and economic costs. There is also a requirement for the remediation to be undertaken in a manner that is acceptable to all significant stakeholders, including the local authority and the future users of the site.

2. Remediation Options Appraisal

Contaminant Linkages

In order to mitigate risks identified at the site, one or more elements of the potentially significant contaminant linkages (source, pathway or receptor) should be removed by the remediation so that there is no longer a potential linkage. The following is a brief appraisal of the feasibility of removing each element from the potential contaminant linkage.

Source Removal

At the scale of the application site there are currently no viable methods for the treatment of soil contamination. Whether in-situ or ex-situ, techniques such as chemical stabilization require heavy machinery and significant working space, which are clearly not feasible in this case.

Excavation and disposal to landfill (often termed ‘dig and dump’) is generally considered unsustainable, and therefore to be minimised as far as practicable.

However, in the case of this project and given the limited area of Made Ground, source removal is considered to be a feasible option for consideration.

Pathway Management

Removing or restricting exposure pathways typically requires the placement of physical barriers such as hard paving or fencing to prevent exposure of site users to any potentially contaminated soil.

In areas where permanent hardstandings are to be constructed, exposure pathways will be removed and there is no requirement to excavate underlying soil to any set depth. Notwithstanding, some excavation will be required to allow the construction of hardstanding to formation levels, and this soil must be disposed of off-site.

Receptor Removal

Receptor removal would require permanently excluding people from using the proposed amenity area. This option is clearly not compatible with the development and will not be considered further.

Most Suitable Option(s)

It is concluded that a combined approach using both source removal (soft landscaped areas) and pathway management (hard paved areas) provides the most practicable and sustainable solution for the development.

3. Summary of Remediation Strategy

Soft Landscaped Areas

For soft landscaped and garden areas, removal of the contamination source will be required.

- Source Removal

Based on Made Ground encountered in the boreholes extending to around 0.3m depth, it is considered removal can be achieved by stripping back to clean underlying natural strata to ensure removal of all Made Ground and other anthropogenic or potentially contaminated material, based on visual inspection during the works.

This approach is likely to produce the smallest volume of material to be excavated and disposed of off-site.

However, it must be ensured that all Ground and other anthropogenic material is completely removed. If the verification sampling were to subsequently identify elevated contamination remaining at depths of less than 0.6m, additional works would be required, along with the associated approvals and delays.

- No Dig Indicator

As no source is anticipated to remain at depths greater than 0.6m, there is considered to be no requirement for marker geotextile acting as a ‘no dig indicator’ at the base of the cover system.

Hard Landscaped and Paved Areas

Fully hard paved areas are generally considered to be ‘capped’ with an engineered cover system preventing access/exposure to any contaminants potentially remaining in underlying soil. Therefore, any areas covered with permanent concrete flags, block paviours, tarmacadam or similar will automatically achieve the remediation objectives, and excavation should not be necessary beyond the depth required for construction.

4. Remediation Criteria

The remediation objectives are deemed to be achieved when the following remediation criteria are met:

1. Any soils present in soft landscaped areas at depths of less than 0.6m to be free from elevated contamination or significant asbestos fibres.
2. A marker geotextile is laid above the Made Ground remaining in-situ below 0.6m depth in any soft landscaped areas.
3. Any soils potentially containing elevated contamination at depths of less than 0.6m are capped beneath permanent hard surfacing.

Soils will be considered free from elevated contamination when tested as set out below and no exceedances of the guideline values set out in Appendix A are observed.

5. Remediation Management

The works shall be managed in line with general good practice and health and safety requirements.

Sourcing of Imported Cover Material

It is ultimately for the client to source the imported cover material as they see fit. This will include the decision on a commercial basis whether to accept recycled material from a permitted facility, or only manufactured or natural soil from a greenfield source.

The latter are generally preferable but not always feasible. However, it must be acknowledged that using recycled soil carries an increased risk of out of specification material being brough onto the site.

It is not unknown for ‘clean’ imported soils to fail validation sampling and return chemical testing results grossly different to those in the chemical testing supplied from the source.

In some cases, clients may be left with the liability of further disposal of such material.

For the above reasons local authorities do not generally favour the use of soils from recycling yards, which generally originate from brownfield sources.

Material Management

All excavation arisings will be managed so as to prevent possible cross contamination of ‘clean’ areas of the site, imported clean soil or other material to remain on-site. Any material suspected of becoming cross contaminated will be moved to the quarantine area for disposal off-site.

It is anticipated that all excavated material will be deposited directly into skips or wagons for disposal off-site. Any skips should be sited on existing hardstandings or polyethylene sheeting to ensure any overspill does not affect underlying ground.

In the event that stockpiling does become necessary, material will be stockpiled on polyethylene sheeting to maintain separation from underlying ground, and further sheeted over to minimise generation of runoff in wet conditions or dust in dry conditions.

Measures should also be implemented to ensure the works do not release sediments into the Thames, and it is noted that the release of entrained solids to surface waters can result in a pollution incident, even where free of chemical contamination.

Such measures would typically comprise the use of sandbags or similar to prevent direct runoff and create a settlement basin allowing any entrained solids to fallout of suspension before runoff leaves the site.

Given space limitations, the importation of clean cover material will not commence until the reduced level dig is complete. Imported cover material will be ‘tipped’ from lorries directly into the areas required.

However, upon arrival and before placement, visual inspection will be made of each lorry load of imported material. Where any evidence of visual or olfactory contamination or deleterious material such as waste, plastic, wood or brick is is observed, the material will be rejected.

Imported material will also be visually inspected for approval using the same criteria during tipping and placement on site.

In the event that stockpiling does become necessary, material will be stockpiled on polyethylene sheeting to maintain separation from underlying ground, and further sheeted over to minimise generation of runoff in wet conditions or dust in dry conditions.

Out of Specification Material

Any material found to be out of specification (as set out in Appendix A) will be quarantined in a defined area of the site pending removal as soon as possible.

Quarantined material will be stockpiled on polyethylene sheeting to maintain separation from underlying ground, and further sheeted over to minimise generation of runoff in wet conditions or dust in dry conditions.

Record Keeping

A record shall be kept of all soil movement and disposal during the works, including movement within the site, disposal off-site and importation onto site. An example tracking sheet has been provided with this document.

In addition, a photographic record of any soil excavation works will need to be made.

Watching Brief

A watching brief of the works will be maintained by the contractor.

As outlined, it will be the responsibility of the contractor to ensure that general records of the works are maintained. However, in addition to this it will also be the responsibility of the contractor to observe and record any unexpected areas of contamination encountered during the construction works.

Should such features be observed then the contractor will contact the consultant for advice prior to proceeding with works in that area.

Should observations result in a material change to the Remediation Statement or a requirement to undertake further risk assessment the local authority would be contacted to confirm their agreement.

6. Remediation Verification

The local authority requires a verification report to be submitted on completion of the remediation works. The report will be based on several lines of evidence, including the verification sampling and record keeping as set out in the following sections.

Verification of Source Removal

Following the excavation works outlined above and before any soils are reinstated, the works should be photographed with a scale rule demonstrating a clear 0.6m depth between the excavation floor and proposed finished levels.

Photographs must clearly show the full site area excavated, with depth reference such as a survey staff or metre rule.

Verification sampling of the excavation is not required, as soil at the base of excavations will be at a depth of at least the thickness of the 0.6m cover system. This is also stated at point 1) under the verification Report heading below.

Verification of Material to be Imported

To ensure that previously contaminated recycled soil is not brought onto the site, any such material proposed for importation must be tested at source before transport to site.

The scope of testing at source will be as set out in Appendix A. Test certificates from a UKAS approved laboratory must be obtained prior to delivery and retained for inclusion in the verification report.

In-Situ Verification of Cover System

The 0.6m clean cover system should comprise circa 0.45m of subsoil and at least 0.15m of topsoil, both from an approved source as set out above.

However, the local authority will require further verification of the cover system once in-situ, both in terms of its chemical composition and thickness above the Made Ground remaining in-situ.

In-situ verification should be carried out on the following basis:

- 1No. hand excavated trial pit per 100m^2 of oft landscaped area – this being 3No. with an area of circa 250m^2
- 2No. samples per hand pit submitted for chemical testing, this being 1No. from each of topsoil and subsoil

7. Verification Report

Report Requirements

Information *required* for inclusion the verification report includes the following:

1) Photographic evidence of excavation to 0.6m below proposed finished levels in soft landscaped areas, with representative scale
2) Photographic evidence of 1No. hand excavated trial pit per 100m2 of soft landscaped area
3) Sampling and chemical testing report for samples from hand pits (2)
4) Full details of the source (company, location, permit, etc.) of the source of imported clean cover material
5) Chemical certificates from a UKAS approved laboratory for imported clean cover material at source.
6) Independent confirmation of clean cover thickness
7) Plans delineating areas subject to differing remedial solutions
8) Copies of original waste transfer notes
9) Remediation completion and verification report

Essential photographic evidence for use in the above should include the following:

a) Any stockpiles/quarantine areas
b) Proof that the depth of inert cover material has been installed
c) Proof of the method of placement and different layers if appropriate
d) Geographical background features to aid identification of the photograph location
e) Site identification boards within the photographs showing the date, position taken (e.g. corner of Plot 3) and the site name

Verification Action Responsibilities

Actions items for which the **client and/or their appointed contractor**(s) will be responsible:

- Photographic evidence of the excavated soft landscaped areas as described in Section 3, with representative scale.
- Full details of the source (company, location, permit, etc.) of the source of imported clean cover material.
- Chemical certificates from a UKAS approved laboratory for imported clean cover material at source.
- Plans delineating areas subject to differing remedial solutions.
- Copies of original waste transfer notes.

Actions items for which the **consultant** (Adeptus) will be responsible*:

- Photographic evidence of 1No. hand excavated trial pit per 100m2 of soft landscaped area
- Sampling and chemical testing report for samples from hand pits (2).
- Independent confirmation of clean cover thickness.
- Remediation completion and verification report.

*The consultant will require to be kept informed as the works progress and given reasonable prior notice to allow attendance on site as required above. Failure to provide any of the above may result in the local authority rejecting the validation report.

APPENDIX A

Subsoil and topsoil verification samples will be subjected to the following suite of chemical testing to ensure suitability for use in soft landscaped areas.

Human Health

- pH, SOM, As, Ba, Be, W/S Boron, Cd, Cr, Cu, Hg, Pb, Ni, Se, V & Zn, PAH EPA-16, TPH-CWG, Asbestos Screen & ID.

The above testing results will be screened against guidelines values for human health risk, as follows (in order of preference).

- LQM/CIEH (2015) Suitable 4 Use Levels (S4UL3785)
- Defra (2014) Category 4 Screening Levels
- CL:AIRE (2009) Soil Generic Assessment Criteria for Human Health

Samples will be packaged and transported to an appropriate UKAS/MCERTS accredited laboratory in a coolerbox.

Phytotoxicity

Validation samples will also be screened against guideline values for phytotoxic metals set out in BS3882[1].

Soils will also be visually inspected for suitability as a growing medium and where any evidence of visual or olfactory contamination or deleterious material such as waste, plastic, wood or brick is is observed, the material will be rejected.

[1] *BS (2015). "Specifications for Topsoil and Requirements for Use." BS3882:2015.*